Available online at www.sciencedirect.com
SciVerse ScienceDirect
Procedia - Social and Behavioral Sciences 46 (2012) 2258 – 2261
Procedia
Social and Behavioral Sciences

WCES 2012

Improvement of knowledge and skills level of wheat-cultivating farmers using on-farm researches

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Abstract

On-farm collaboration allows farmers and researchers to share observations, and lets the researcher draw on the farmer's experience with a farm and its problems. This can be a good beginning for choosing topics suitable for demonstrations or research (Anderson and Lockeretz, 1991). The field study was conducted to evaluate yield comparison of seven bread and durum genotypes in two different locations (Helal-Ahmar and Astan-e-Ghods) of Khorasan Razavi, Iran. Analysis of combined data showed non-significant variation among two different locations. It means that ecological conditions of Helal-Ahmar and Astan-e-Ghods locations are offer for production of durum wheat. The bread wheat cultivar of G7 and durum wheat line G4 were both produced the highest grain yield in each farmers' experimental fields. From the results, it can be concluded that the new selected promising wheat genotypes are able to increase the farmers' level of economic and productivity.

Keywords: durum wheat, farmer skillS, grain yield, on-farm research;

1. Introduction

Many wheat-cultivating farmers in rural areas do not have the most up-to-date information on how to grow food efficiently and economically. Improving their knowledge and skills including new methods and techniques can dramatically increase the farmers' level of productivity.

According to available statistics (USDA, 2009; Shewry, 2009 and INIW, 2012) durum wheat is a crop adapted to marginal lands. Sowing area of durum wheat in Iran is 211034 hectare which constitutes 3% of the total wheat sowing area with production averaging about 550352 tons annually. Therefore, there is a big gap between durum wheat cultivated area in Iran (3% of bread wheat) compared to durum wheat sowing area in the world (6%). It seems one of the most important reasons for low cultivation of durum is insufficient attention to durum wheat from breeders and farmers. Even in areas with low rainfall, farmers prefer to cultivate bread wheat, which relegates durum wheat cultivation to more marginal areas. It can be due to farmer's insufficient scientific information and also lack of desirable high yielding durum wheat seeds compared to bread wheat for planting in different environmental conditions (Siddique et al., 2000; Moayedi et al., 2010; Moayedi et al., 2011).

On-farm collaboration allows farmers and researchers to share observations, and lets the researcher draw on the farmer's experience with a farm and its problems. This can be a good beginning for choosing topics suitable for demonstrations or research. A valuable benefit of on-farm research is the possibility of combining farmers' experience and practical knowledge with researchers' expertise. In addition, on-farm research is an indispensable tool for developing and validating alley farming technology. On-farm research can be defined in its simplest terms as research carried out on farmer's fields and in a farmer's environment. It plays essential roles in development and adaptation of alley farming technologies for local farmers' conditions (Tta-Krah and Francis, 1987; Anderson and Lockeretz, 1991; Moayedi and Azizi, 2011). Most studies on durum wheat have focused on stability characteristics of genotypes for grain yield. Therefore, the objective of this study was to evaluate grain yield of 6 durum wheat (*T.*

 doi:10.1016/j.sbspro.2012.05.465

turgidum spp. durum) genotypes and 1 bread wheat cultivar in two locations (Helal-Ahmar and Astan-e-Ghods) of Iran and to select genotypes having desirable traits to be used in future durum wheat breeding program.

2. Methodology

Khorasan Razavi province in Iran was considered to perform this experiment. Experimental sites were done in the fields of two large-scale farmers who have the potential to help achieve the goals of this on- farm research. The study was conducted to compare grain yield of 7 durum and bread wheat genotypes (according to the genotypes presented in Table 1) during the 2010-2011 growing season in Helal-Ahmar and Astan-e-Ghods farmer's fields at the Khorasan-e-Razavi, Iran. At each experimental location, all genotypes were sown using completely randomized block design with three replications. Agronomical practices of trial sites were conducted basis on local conventional condition and each experimental plot size was 24 m2. Collected data were subjected to the analysis of variance (ANOVA) using MSTATC software and comparative analyses of the means were performed using the Duncan's Multiple Range Test ($P < 0.05$ and $P < 0.01$).

Table 1. Durum and bread wheat studied genotypes in two locations

Genotype no.	Durum or bread wheat	Cultivar or line name
G1	Durum wheat cultivar	Arya
G2	Durum wheat cultivar	Dena
G3	Durum wheat advance line	D-83-10
G4	Durum wheat advance line	D-84-3
G5	Durum wheat advance line	D-86-5
G6	Durum wheat advance line	D-86-6
G7	Bread wheat cultivar	Bahar

2. Findings

According to the data presented in Tables 2 and 3, the results of the analysis of variances showed that differences among the genotypes were highly significant for grain yield at each location which demonstrates the presence of genetic variability among studied durum and bread wheat genotypes. In the combined analysis of variance, genotypic effect and also genotype × location interaction were significant ($P<0.01$) for wheat yield, whereas location effect was no significant for this traits. It can be concluded that there were no differences among the locations. Therefore, durum wheat cultivating is capable in two Helal-Ahmar and Astan-e-Ghods farmers' field conditions. The results of this study in agreement with reports of Askarinia et al. (2008) who revealed that interaction of genotype × environment on wheat had the most shares in justifying grain performance variation. Grain yield of Helal-Ahmar and Astan-e-Ghods locations are given in figure 1. The wheat yield of the genotypes in two locations ranged from 3500 to 5133 kg/ha with a mean value of 4519 kg/ha. The highest grain yield was obtained from the G7 bread wheat cultivar (5133 kg/ha) under Helal - Ahmar field condition. It followed by G7 (5010 kg ha-1) and G4 (4933 kg/ha) in Astan-e-Ghods and also G4 (4900 kg/ha) under Helal-Ahmar field condition. Although, those genotypes produced different grain yield, nonetheless there were no significant difference among the noted genotypes. In the other hand, G7, G4, G1genotypes in both locations, G6 and G5 (in Astan-e-Ghods) had the maximum production and they arranged in one statistical group. Helal – Ahmar location had the lowest averaged values for grain yield. As a result, the genotype was the most important factor affecting the grain yield in this study. However, Grain yield was influenced both by genotype and by environment which was agreed with results of Akcura et al. (2005) and Fufa et al. (2005).

Table 2. Analysis of variance for grain yield in different locations

Source of variations	Mean square		
	df	Helal-Ahmar	Astan-e- Ghods
Replication	2	0.02	0.06
Genotype	6	1.01**	0.68**
Error	12	0.04	0.04
CV %	-	4.41	4.42

** significant difference at $P < 0.01$ ns: no significant

Table 3. Combined analysis of variance for grain yield

Source of variations		Mean square
	df	GY
Location (L)	1	0.1 ns
Genotype (G)	6	0.4**
L×G	6	0.3**
Error	24	0.4
CV %	-	4.65

** significant difference at $P < 0.01$

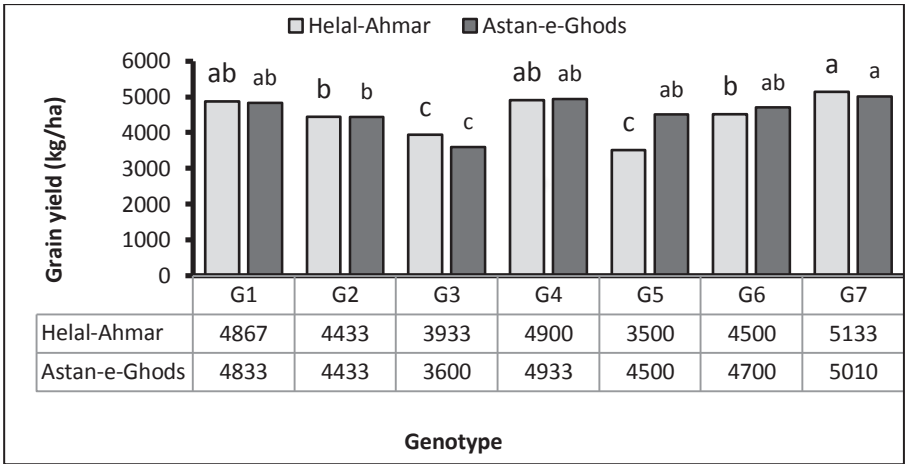

Fig. 1. Grain yield comparison of studied genotypes in two locations

3. Conclusion

It is clearly that farmers should be stay up-to-date on the latest scientific information. Improving their knowledge and skills including new methods and techniques can dramatically increase the farmers' level of productivity. On-farm research is often used to generate new or modified technologies. Moving to farmers' fields and interacting with farmers allows the researcher to have an appreciation of the farmers' conditions and problems. According to available statistics, there is a big gap between durum wheat cultivated area in Iran (3% of bread wheat) compared to durum wheat sowing area in the world (6%). It can be due to insufficient attention to durum wheat from breeders and farmers and also lack of desirable high yielding durum wheat seeds. Analysis of data showed non-significant variation among two different locations. It means that ecological conditions of Helal-Ahmar and Astan-e-Ghods locations are offer for production of durum wheat. Moreover, the bread wheat cultivar G7 and durum wheat advanced line G4 were both produced the highest grain yield at each farmer's experimental fields. From the results, it can be concluded that G4 durum wheat genotype might be able to increase the farmers' level of economic and productivity.

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